

WHAT IS CLAIMED IS:

1. A semiconductor device in which a second conductive layer is connected through a connection pillar onto a first conductive layer embedded in a groove formed on an insulation film, wherein:

said connection pillar is formed on said first conductive layer to be self-aligned with respect to said first conductive layer without any usage of a growth guide.

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2. A semiconductor device according to claim 1, wherein said first conductive layer is made of one of Al, Cu, Au and Ag.

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3. A semiconductor device according to claim 1, wherein said first conductive layer is made of one of an Al alloy, a Cu alloy, an Au alloy and an Ag alloy.

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4. A semiconductor device according to claim 1, wherein said connection pillar is made of one of Al, Cu, Au and Ag.

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5. A semiconductor device according to claim 1, wherein said connection pillar is made of one of an Al alloy, a Cu alloy, an Au alloy and an Ag alloy.

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6. A semiconductor device according to claim 1, wherein said first conductive layer and said connection pillar are made of the same metal or alloy.

7. A semiconductor device according to claim 1,

wherein said first conductive layer and said connection pillar are crystallographically aligned with each other.

8. A semiconductor device according to claim 1,
5 wherein:

said first conductive layer and said connection pillar are made of the same metal or the alloy thereof having a face-centered cubic structure, and

said first conductive layer and said connection
10 pillar have a $\langle 111 \rangle$ preferred orientation.

9. A semiconductor device according to claim 1,
wherein said first conductive layer is a lower layer wiring and said second conductive layer is an upper layer
15 wiring.

10. A semiconductor device in which a second conductive layer is connected through a connection pillar onto a first conductive layer embedded in a groove formed
20 on an insulation film, wherein:

a growth suppression film having an opening whose width is wider than a width of said first conductive layer is formed on said insulation film and said first conductive layer, and

25 said connection pillar is formed on said first conductive layer within said opening of said growth suppression film to be self-aligned with respect to said first conductive layer.

30 11. A semiconductor device according to claim 10, wherein said first conductive layer is made of one of Al,

Cu, Au and Ag.

12. A semiconductor device according to claim 10,
wherein said first conductive layer is made of one of an
5 Al alloy, a Cu alloy, an Au alloy and an Ag alloy.

13. A semiconductor device according to claim 10,
wherein said connection pillar is made of one of Al, Cu,
Au and Ag.

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14. A semiconductor device according to claim 10,
wherein said connection pillar is made of one of an Al
alloy, a Cu alloy, an Au alloy and an Ag alloy.

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15. A semiconductor device according to claim 10,
wherein said first conductive layer and said connection
pillar are made of the same metal or alloy.

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16. A semiconductor device according to claim 10,
wherein said first conductive layer and said connection
pillar are crystallographically aligned with each other.

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17. A semiconductor device according to claim 10,
wherein:

said first conductive layer and said connection
pillar are made of the same metal or the alloy thereof
having a face-centered cubic structure, and

said first conductive layer and said connection
pillar have a $\langle 111 \rangle$ preferred orientation.

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18. A semiconductor device according to claim 10,

wherein said growth suppression film is composed of one of a silicon oxide film, a silicon nitride film and an aluminum oxide film.

5 19. A semiconductor device according to claim 10, wherein said first conductive layer is a lower layer wiring and said second conductive layer is an upper layer wiring.

10 20. A method of manufacturing a semiconductor device, in which a second conductive layer is connected through a connection pillar onto a first conductive layer embedded in a groove formed on an insulation film, including the steps of:

15 forming said first conductive layer embedded in the groove formed in said insulation film; and
 forming said connection pillar on said first conductive layer to be self-aligned with respect to said first conductive layer without any usage of a growth
20 guide.

 21. A method of manufacturing a semiconductor device according to claim 20, wherein said connection pillar is formed by a selective CVD method.

25 22. A method of manufacturing a semiconductor device according to claim 20, wherein said first conductive layer is made of one of Al, Cu, Au and Ag.

30 23. A method of manufacturing a semiconductor device according to claim 20, wherein said first

conductive layer is made of one of an Al alloy, a Cu alloy, an Au alloy and an Ag alloy.

24. A method of manufacturing a semiconductor
5 device according to claim 20, wherein said connection
pillar is made of one of Al, Cu, Au and Ag.

25. A method of manufacturing a semiconductor
device according to claim 20, wherein said connection
10 pillar is made of one of an Al alloy, a Cu alloy, an Au
alloy and an Ag alloy.

26. A method of manufacturing a semiconductor
device according to claim 20, wherein said first
15 conductive layer and said connection pillar are made of
the same metal or alloy.

27. A method of manufacturing a semiconductor
device according to claim 20, wherein said first
20 conductive layer and said connection pillar are
crystallographically aligned with each other.

28. A method of manufacturing a semiconductor
device according to claim 20, wherein:
25 said first conductive layer and said connection
pillar are made of the same metal or alloy thereof having
a face-centered cubic structure, and
said first conductive layer and said connection
pillar have a <111> preferred orientation.

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29. A method of manufacturing a semiconductor

device according to claim 20, wherein said first conductive layer is a lower layer wiring and said second conductive layer is an upper layer wiring.

5 30. A method of manufacturing a semiconductor device in which a second conductive layer is connected through a connection pillar onto a first conductive layer embedded in a groove formed on an insulation film, comprising the steps of:

10 forming said first conductive layer embedded in the groove formed on said insulation film;

 forming a growth suppression film having an opening whose width is wider than a width of said first conductive layer on said insulation film and said first
15 conductive layer, and

 forming said connection pillar on said first conductive layer within said opening of said growth suppression film to be self-aligned with respect to said first conductive layer.

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 31. A method of manufacturing a semiconductor device according to claim 30, wherein said connection pillar is formed by a selective CVD method.

25 32. A method of manufacturing a semiconductor device according to claim 30, wherein said first conductive layer is made of one of Al, Cu, Au and Ag.

 33. A method of manufacturing a semiconductor
30 device according to claim 30, wherein said first conductive layer is made of one of an Al alloy, a Cu

alloy, an Au alloy and an Ag alloy.

34. A method of manufacturing a semiconductor device according to claim 30, wherein said connection pillar is made of one of Al, Cu, Au and Ag.

35. A method of manufacturing a semiconductor device according to claim 30, wherein said connection pillar is made of one of an Al alloy, a Cu alloy, an Au alloy and an Ag alloy.

36. A method of manufacturing a semiconductor device according to claim 30, wherein said first conductive layer and said connection pillar are made of the same metal or alloy.

37. A method of manufacturing a semiconductor device according to claim 30, wherein said first conductive layer and said connection pillar are crystallographically aligned with each other.

38. A method of manufacturing a semiconductor device according to claim 30, wherein:

said first conductive layer and said connection pillar are made of the same metal or alloy thereof having a face-centered cubic structure, and

said first conductive layer and said connection pillar have a $\langle 111 \rangle$ preferred orientation.

39. A method of manufacturing a semiconductor device according to claim 30, wherein said growth

suppression film is composed of one of a silicon oxide film, a silicon nitride film and an aluminum oxide film.

40. A method of manufacturing a semiconductor
5 device according to claim 30, wherein said first
conductive layer is a lower layer wiring and said second
conductive layer is an upper layer wiring.